

Air Pollution and Climate Change

Objectives:

- Give students idea of both non-human and manmade sources of air pollution
- Explain the effects of air pollution on human, animal, and plant health
- Provide introductory knowledge on what greenhouse gasses are and their effect on the atmosphere
- Suggest ideas on feasible ways to cut down on personal air pollution impact
- Give basic insight on the issue of global warming and climate change

Oklahoma Academic Standards Addressed:

- K.PS3.1 Make observations to determine the effect of sunlight on Earth's surface.
- K.ESS2.1 Use and share observations of local weather conditions to describe patterns over time.
- K.ESS2.2 Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.
- K.ESS3.2 Ask questions to understand the purpose of weather forecasting to prepare for and respond to severe weather.
- 1.ESS3.1 Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.
- 2.ESS1.1 Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
- 3.LS3.2 Use evidence to support the explanation that traits can be influenced by the environment.
- 3.LS4.4 Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.
- 3.ESS2.2 Obtain and combine information to describe climates in different regions of the world.
- 4.ESS3.1 Obtain and combine information to describe that energy and fuels are derived from renewable and non-renewable resources and how their uses affect the environment.
- 4.ESS3.2 Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

Vocabulary:

- Pollution - The introduction of a substance to the environment that is harmful or has negative effects.
- Particulate Matter - Larger pieces of pollutants. An example is ash from a fire.
- Smog - Haze or fog combined with air pollutants that creates visible air pollution.
- Emission - A product of something, like a gas. In relation to air pollution, the burning of a gas can create chemicals like carbon dioxide that go into the air.
- Atmosphere - The layering of gasses that surrounds the earth and other planets.
- Acid Rain - Rain with increased acidity due to the pollution it absorbs in the air

Talking Points:

- What is pollution? Pollution is the introduction of a substance to the environment that is harmful or has negative effects.
- What produces air pollution?
 - Air pollution can come from both natural and human sources. Can you think of anything that might make our air less clean?
 - Natural: Volcanos, wildfires, etc.
 - Human: Automobile emissions, farming, burning fossil fuels (coal, petroleum, natural gas), etc.
- What are the different TYPES of air pollution?
 - Particles in the air that are often produced by actions such as burning, can range from easily visible to so small it seems invisible to the naked eye. Particles like ash that are solid bits and pieces that result from this, are classified as “**particulate matter.**”
 - But air pollution isn’t just solid particles, but also gas. When combined, this solid and gaseous mixture can produce severe air pollution like **smog**. Smog is a haze or fog combined with air pollutants that creates visible air pollution.
- What are some examples of gas emissions that pollute the air? (Carbon Dioxide CO₂, methane, ozone, etc.)
 - These are known as Greenhouse Gasses. The term greenhouse is used in this name to draw the similarity to the heat that is often trapped within actual plant greenhouses and these pollutant gasses being trapped within the earth's atmosphere. This is why over the years the earth has seen a trend of increasing temperatures all across the globe.
- What is the atmosphere?

- It is the layering of gasses that surrounds the earth and other planets.
- What is the purpose of the atmosphere?
 - Serve as a barrier between the planet and space that keeps the climate and air in.
 - Protects us from the sun and excessive heat.
 - The atmosphere keeps the earth a habitable place to live, however human sources of air pollution have greatly increased the rate of greenhouse gas emissions far past what it would have been naturally at this time.

- WHY does clean air matter?
 - Air pollution has many negative effects both on human and environmental health. Plants have been choked out by uninhabitable air quality, sun at times even potentially becoming blocked out, leaving little potential for processes like photosynthesis that require it, and events like acid rain.
 - Acid rain is rain with increased acidity due to the pollution it absorbs in the air, having effects on plant growth, aquatic ecosystems, etc. This has led to food sources declining and species shrinking as a result. Thus, over several centuries the build up of this pollution has resulted in ecosystems and species of plants and animals facing extinction far sooner than what they would have naturally.
 - Yet, humans also meet the effects of air pollution every day. Breathing in this polluted air over time makes for an increase of health issues, particularly of the lungs and heart, which is especially an issue in big, busy cities.

- WHAT can you do to limit your own contribution to air pollution? *ask for ideas*
 - Grow plants! Plants are great at recycling and storing some gasses like CO₂. This offsets your “carbon footprint”, or the amount of carbon dioxide and other carbon compounds emitted due to the consumption of fossil fuels by a particular person, group, etc.
 - Ride a bike
 - Compost
 - Buy recycled, thrifted, vintage, etc. clothes (the fossil fuels used to transport and produce these products will have been far less than that of purchasing new clothes, as well as it reduces solid landfill waste!)
 - Use less stuff! This limits production of new materials, which causes factories to release more chemicals into the air.

Activity Components:

- Air Pollution Coloring Sheet:
www.okcbeautiful.com/uploads/Air_Pollution_Worksheet.pdf

Resources:

- General review - <https://youtu.be/fephtPt6wk>
- Greenhouse Gasses - <https://youtu.be/VYMjSule0Bw>
- Climate Change - <https://youtu.be/Sv7OHfpIRfU>